R E M A R K S

Reconsideration of this application, as amended, is respectfully requested.

THE SPECIFICATION

The specification has been amended to correct some minor informalities of which the undersigned has become aware so as to better accord with Fig. 5. No new matter has been added, and it is respectfully requested that the amendments to the specification be approved and entered.

THE DRAWINGS

Fig. 3 has been amended to correct a minor error of which the undersigned has become aware. In particular, Fig. 3 has been amended at steps S03 and S05 to replace the word “AMENDMENT” with “ADJUSTMENT”, so as to better accord with the corresponding disclosure in the specification.

Submitted herewith are a corrected sheet of formal drawing which incorporates the amendments and an annotated sheet showing the changes made thereto.

No new matter has been added, and it is respectfully requested that the amendment to the drawings be approved and entered.

THE CLAIMS

Claim 1 has been amended to clarify that the height coordinate acquisition position setting unit respectively sets, as each of the positions in which the height coordinate Z is acquired, a different grid point positioned in an area including the sample image from among grid points of sections obtained by setting a rectangular sample area which bounds the sample image area and dividing the set rectangular sample area at predetermined intervals in grid form. See Fig. 5 and the corresponding disclosure in the specification.

No new matter has been added, and it is respectfully requested that the amendments to the claims be approved and entered.

THE PRIOR ART REJECTION

Claims 1 and 2 were rejected under 35 USC 103 as being obvious in view of the combination of USP 6,215,892 ("Douglass et al") and USP 7,027,628 ("Gagnon et al"). These rejections, however, are respectfully traversed with respect to the claims as amended hereinabove.

According to the present invention as recited in independent claim 1, a height coordinate acquisition position setting unit automatically sets a plurality of positions in an XY direction over a sample image area (in which a sample image exists)

extracted by a sample image area extraction unit, and a height coordinate Z is acquired in each of these positions.

Significantly, as recited in amended independent claim 1, the height coordinate acquisition position setting unit respectively sets, as each of the positions in which the height coordinate Z is acquired, a different grid point positioned in an area including the sample image from among grid points of sections obtained by setting a rectangular sample area which bounds the sample image area and dividing the set rectangular sample area at predetermined intervals in grid form.

With this structure, by setting a rectangular sample area which bounds the sample image area and dividing the set rectangular sample area at predetermined intervals in grid form, height coordinate acquisition positions can be set at appropriate intervals only in areas in which a sample exists. As a result, the claimed present invention achieves an advantageous effect whereby a focal point can be certainly and accurately determined for adjustment in the Z direction on the basis of optimal precision of an adjustment of a tilt of a sample.

It is respectfully submitted that the cited references do not at all disclose, teach or suggest the above described feature and advantageous effect of the present invention as recited in amended independent claim 1.

In particular, it is respectfully submitted that the cited references, either singly or in combination, do not disclose or suggest setting <u>a rectangular sample area which bounds the sample image area</u>, dividing the set rectangular sample area at predetermined intervals in grid form, and respectively setting, as each of the positions in which the height coordinate Z is acquired, a different grid point positioned <u>in an area including the sample image</u> from among the grid points of sections obtained by dividing the set rectangular sample area, as according to the present invention as recited in amended claim 1.

On pages 3 and 4 of the Office Action, the Examiner asserts that Douglass et al discloses at column 11, lines 9-12 and 24-30 and column 12, lines 20-26 “automatically setting a plurality of horizontal positions in which a height coordinate Z is acquired from the extracted sample image area and reading a height coordinate which is a focal point position of the high magnification optical system in each of the set horizontal positions”, and that Douglass et al discloses at column 11, lines 24-60 “setting a position of a grid point including the sample image in grid points by dividing the image at predetermined intervals in grid form”.

It is respectfully pointed out, however, that the portion of Douglass et al relied upon by the Examiner merely relates to a technique for finding a “best-fit” focus plane, or “least-squares

fit" focus position for Z-coordinate height adjustment.

According to Douglass et al,

> ". . .the Z stage is stepped over a user-specified range of focus positions, with step sizes that are also user-specified. . . this initial set of variance versus focus-position data are least-squares fit to a Gaussian function at [step] 228 [of Fig. 13A]. The location of the peak of this Gaussian curve determines the initial or coarse estimate of focus position for input to step 232.
>
> Following this, a second stepping operation 232-242 is performed utilizing smaller steps over a smaller focus range centered on the coarse focus position. Experience indicates that data taken over this smaller range are generally best fit by a second order polynomial. Once this least squares fit is performed at 240, the peak of the second order curve provides the fine focus position at 244.
>
> Fig. 14 illustrates a procedure for how this focusing method is utilized to determine the orientation of a slide in its carrier. As shown, focus positions are determined, as described above, for a 3x3 grid of points centered on the scan area at 264. Should one or more of these points lie outside the scan area, the method senses at 266 this by virtue of low values of pixel variance. In this case, additional points are selected closer to the center of the scan area. FIG. 15 shows the initial array of points 80 and new point 82 selected closer to the center. Once this array of focus positions is determined at 268, a least squares plane is fit to this data at 270. Focus points lying too far above or below this best-fit plane are discarded at 272 (such as can occur from a dirty cover glass over the scan area), and the data is then refit. This plane at 274 then provides the desired Z position information for maintaining focus during scanning.
>
> After determination of the best-fit focus plane, the scan area is scanned in an X raster scan over the scan area as described earlier. During scanning, the X stage is positioned to the starting point of the scan area, the focus (Z) stage is positioned to the best fit focus plane, an image is acquired and processed as described later, and this process is repeated for all points over the scan area" (column 11, lines 24-64, emphasis added).

Thus, according to Douglass et al, a user sets a Z-stage at a plurality of positions (i.e., height positions of a stage for a slide), these user-specified positions are least-squares fit to obtain a Gaussian curve, and the peak of this curve is set as an

initial or coarse estimate for the (vertical) focus position. Then a second Gaussian curve is obtained by performing a similar process over a smaller focus range centered around the coarse estimate focus position obtained from the first Gaussian curve, and the peak of this second curve is set as a fine focus position. This process is performed based on a 3x3 grid of points centered on the scan area. Moreover, the disclosure at column 12, lines 20-26 of Douglass et al (pointed to by the Examiner) merely relates to reverting back to coarse focus processing if parameters indicate that a focus position at a higher magnification is inaccurate.

It is respectfully pointed out that, in Douglass et al, a grid point of the 3x3 grid may lie <u>outside the scan area</u>, and therefore a new point must be selected closer <u>to the center of the scan area</u>, contrary to the claimed present invention. And Douglass et al does not at all disclose or suggest that this newly selected grid point must be in an area <u>which includes the sample image</u>, as according to the claimed present invention. In addition, it is respectfully pointed out that, according to Douglass et al, after the appropriate array of focus positions is found, a least-squares plane is fit to this data, thereby determining a <u>best-fit focus plane</u> which provides the desired Z position information.

By contrast, according to the present invention as recited in amended independent claim 1, a plurality of positions is automatically set in an XY direction over a sample image area in each of which a height coordinate Z is acquired, and a different grid point which is positioned in an area including the sample image from among grid points of sections obtained by setting a rectangular sample area which bounds the sample image area and dividing the set rectangular sample area at predetermined intervals in grid form is respectively set as each of the positions. That is, according to the claimed present invention, an appropriate height coordinate Z is acquired for <u>each</u> position (and not merely for a best-fit plane found based on focus position information corresponding to a 3x3 array of grid points over an entire scan area), and a different grid point <u>which includes the sample image</u> is respectively set as each (different) position. Moreover, according to the claimed present invention, the grid points are obtained by setting <u>a rectangular sample area which bounds the sample image area</u>.

It is respectfully submitted that Douglass et al does not at all disclose or suggest the above described feature of the claimed present invention whereby a different grid point <u>which includes a sample image</u> and is obtained by setting <u>a rectangular sample area which bounds the sample image area</u> and dividing the set rectangular sample area at predetermined intervals in grid

form is respectively set as each of the positions in which a height coordinate Z is acquired. Indeed, as pointed out above, Douglass et al merely discloses a technique for finding a <u>best-fit focus plane</u> based on a 3x3 array of grid points centered on <u>the entire scanning area</u>. And it is respectfully submitted, therefore, that Douglass et al does not at all achieve the advantageous effect of the claimed present invention whereby a focal point can be certainly and accurately determined for adjustment in the Z direction on the basis of optimal precision of an adjustment of a tilt of a sample.

It is respectfully pointed out, moreover, that this portion of Douglass et al relates to acquiring a Z-coordinate position information through a multi-step process involving both user-specified Z-stage positions and positions obtained through use of least-squares fit operations. However, the distinguishing feature of the present invention is not related to the method of acquiring an appropriate z-coordinate focus position. Indeed, as disclosed in the specification of the present application, "the coordinates (Z) can be easily obtained by autofocus processing" (page 21, lines 2-21). Rather, the distinguishing feature of the present invention relates to setting the <u>height coordinate acquisition positions in an XY direction</u> within a set rectangular sample area which bounds the sample image area. And, for the reasons explained hereinabove, it is respectfully submitted that

Douglass does not at all disclose or suggest the above described feature of the present invention as recited in amended independent claim 1 whereby each of a plurality of positions automatically set in an XY direction over a sample image area in which a height coordinate Z is acquired is respectively set as a different grid point positioned in an area including the sample image from among grid points of sections obtained by setting a rectangular sample area which bounds the sample image area and dividing the set rectangular sample area at predetermined intervals in grid form.

Gagnon et al, moreover, has merely been cited with respect to calculating a Z coordinate, and it respectfully submitted that Gagnon et al also does not at all disclose or suggest setting a rectangular sample area which bounds a sample image area and dividing the set rectangular sample area at predetermined intervals in grid form, as according to amended claim 1.

Accordingly, it is respectfully submitted that Douglass et al and Gagnon et al, considered singly or in combination, do not achieve or render obvious the above described feature and effect of the claimed present invention.

* *

In view of the foregoing, it is respectfully submitted that amended independent claim 1 and claim 2 depending therefrom clearly patentably distinguish over Douglass et al and Gagnon et al, taken singly or in combination, under 35 USC 103.

Entry of this Amendment, allowance of the claims and the passing of this application to issue are respectfully solicited.

If the Examiner has any comments, questions, objections or recommendations, the Examiner is invited to telephone the undersigned at the telephone number given below for prompt action.

Respectfully submitted,

Douglas Holtz
Reg. No. 33,902

Frishauf, Holtz, Goodman & Chick, P.C.
220 Fifth Avenue - 16th Floor
New York, New York 10001-7708
Tel. No. (212) 319-4900
Fax No. (212) 319-5101

DH:bl
encs.